The Cryosphere Discuss., 3, C11–C12, 2009
www.the-cryosphere-discuss.net/3/C11/2009/

The Cryosphere Discussions

Interactive comment on "Increased rate of acceleration on Pine Island Glacier strongly coupled to changes in gravitational driving stress" *by* J. B. T. Scott et al.

B. Smith (Referee)

ben@ess.washington.edu

Received and published: 20 March 2009

This paper presents some of the first ground-truth data for the changes underway on Pine Island Glacier. While the spatial coverage of the GPS data presented is much more limited than the remote-sensing data sets previously used in the PIG region, the temporal resolution allows the significant negative finding that the ice speed is not tidally modulated in the PIG as it is in the Siple Coast ice streams. The velocity data also adds recent time points to the time-series of elevation-change and velocity measurements for the PIG, showing continued thinning and acceleration.

The authors' analysis suggests a mechanism for the acceleration of the upper part of

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

the glacier which, while not a comprehensive explanation for the changes underway on the entire glacier, shrinks the locus for the processes driving the changes to a small area near the grounding line. This is a valuable step in understanding the changes underway in the PIG system.

I have only minor editorial comments on the text.

Section 4, end of first paragraph: "These accumulation values agree ... and we calculate an uncertainty of +- 20%." This sentence is ambiguous as to the value to which the uncertainty applies. Is it the uncertainty in the long-term average accumulation rate? In the accumulation during the study period? In the thinning rate? This error appears to have been propagated into figure 3, but it would be good to specify how.

Section 5 page 6: "...a mean gradient of logitudinal stress of -1.5 kPa for this region" The longitudinal stress gradient has units of kPa/m, so this can't quite be right. In fact, it's a common misstatement- the factor referred to here is the longitudinal resistive stress, which is the ice thickness times the longitudinal stress gradient: "the resistive stress due to the longitudinal stress gradient is 1.5 kPa for this region."

Section 5 page 6: It seems strange to obtain D from a best fit, and calculate the Rˆ2 for the best fit; it's not very surprising that the correlation is high, and not very informative. It would make more sense to calculate the Rˆ2 value using the priori value of D (27600 (maˆ2)ˆ(1/3)) together with its uncertainty. Given the size of the errorbars in figure 3, and the small difference between the fit and calculated D values, this would probably give a strong correlation.

Interactive comment on The Cryosphere Discuss., 3, 223, 2009.